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Short communication

Occurrence of *Neospora caninum* antibodies in sera from dogs of the city of São Paulo, Brazil

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Abstract

Neospora caninum is an important cause of abortion in dairy cattle worldwide. Dogs are important in the epidemiology of this parasite because they are the only hosts known to excrete *N. caninum* oocysts. In order to understand the prevalence of *N. caninum* in dogs, sera from 500 owned dogs and from over 600 feral street dogs from the city of São Paulo, Brazil were assayed for antibodies to *N. caninum*. Sera were examined by the *Neospora* agglutination test (NAT) using mouse-derived tachyzoites. Antibodies ($\geq 1:25$) to *N. caninum* were found in nearly 10% (49/500) of owned dogs and in 25% (151/611) of stray dogs. NAT titers for owned dogs were 1:25 in 28 (5.6%) dogs, 1:50 in 20 (4%) dogs, and $\geq 1:500$ in 1 (0.2%) dog. NAT titers for stray dogs were 1:25 in 79 (12.9%) dogs, 1:50 in 68 (11.1%) dogs, and $\geq 1:500$ in 4 (0.6%) dogs. These data indicate that feral dogs may be important in the epidemiology of *N. caninum* infection. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: *Neospora caninum*; Antibodies; *Neospora* agglutination test; Brazil

1. Introduction

Neospora caninum causes mortality in cattle, dogs, sheep, goats, deer and horses (Dubey and Lindsay, 1996). It is considered an important cause of abortion in dairy cattle worldwide

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(Thilsted and Dubey, 1989; Dubey and Lindsay, 1996; Anderson et al., 2000). The domestic dog (*Canis familiaris*) is the only definitive host known to excrete *N. caninum* oocysts (McAllister et al., 1998; Basso et al., 2001a). Although the role of dogs in the natural epidemiology of *N. caninum* infections in cattle and other hosts is uncertain, several studies have reported a positive relationship between dogs and bovine neosporosis (Paré et al., 1998; Sawada et al., 1998; Wouda et al., 1999). Lindsay and Dubey (2000) summarized worldwide reports of clinical and subclinical infections in dogs. The objective of the present study was to examine the prevalence of *N. caninum* antibodies in dogs from the city of São Paulo, Brazil.

2. Materials and methods

Blood samples were collected from 611 dogs captured from the streets of São Paulo by the Zoonosis Control Center. Samples were also collected from 500 owned dogs from the same city. Sera were separated and stored at -20°C until tested. The dogs were of both sex and of different ages and breeds.

Sera were tested for *N. caninum* antibodies using the Neospora agglutination test (NAT), as described by Romand et al. (1998). For NAT, mouse-derived tachyzoites of the NC-1 strain were used. Mercaptoethanol was incorporated in the test to destroy IgM and non-specific reactions. Initial screening was conducted at a 1:25 serum dilution. Positive sera were further tested at 1:50 and 1:500 dilutions.

3. Results and discussion

Antibodies ($\geq 1:25$) to *N. caninum* were found in nearly 10% (49/500) of owned dogs and in 25% (151/611) of stray dogs. NAT titers for owned dogs were 1:25 in 28 (5.6%) dogs, 1:50 in 20 (4%) dogs, and $\geq 1:500$ in 1 (0.2%) dog. NAT titers for stray dogs were 1:25 in 79 (12.9%) dogs, 1:50 in 68 (11.1%) dogs, and $\geq 1:500$ in 4 (0.6%) dogs. The majority of positive dogs had serum NAT titers at or below 1:50 (Table 1). A titer of 1:25 was selected as indicative of *N. caninum* infection based on studies in naturally and experimentally infected cattle (de Marez et al., 1999; Venturini et al., 1999).

This is the largest serologic survey of dogs for *N. caninum* and involved over 1100 dogs from one city. The sera were tested by NAT in three dilutions because nothing is known of the specificity and sensitivity of the NAT for determining antibodies to *N. caninum* in dogs. The NAT is however specific because no cross reactions were found with related

Table 1
Neospora caninum agglutination antibody test titers in owned and stray dogs from the city of São Paulo, Brazil

Group	Total number	No. of dogs (%) per titer		
		25	50	≥ 500
Owned dogs	500	28 (5.6)	20 (4.0)	1 (0.2)
Stray dogs	611	79 (12.9)	68 (11.1)	4 (0.6)

apicomplexan parasites, especially *Toxoplasma gondii* (Romand et al., 1998; Dubey et al., 1998a,b).

The prevalence of *N. caninum* antibodies in stray dogs (24.7%) was more than 2.5 times of that in owned dogs (9.8%) indicating higher chances for street dogs to become infected with *N. caninum*. Little is known at the present regarding natural epidemiology of *N. caninum* infection. Although congenital *N. caninum* infections can be clinically severe in dogs, the prevalence rate of congenital infection is unknown (Dubey and Lindsay, 1996). Little is also known whether dogs that are seropositive have or have not shed *N. caninum* oocysts. Until recently, *N. caninum* oocysts were not found in the feces of naturally infected dogs. Basso et al. (2001b) demonstrated *N. caninum* oocysts in the feces of a naturally infected dog from Argentina. Whether higher *N. caninum* infection in stray dogs versus owned dogs is related to ingestion of food contaminated with oocysts or tissue cysts needs further investigation.

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